

Chemical Industries Week

March 3, 1951

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New processes for waste chromic acid recovery, ease supply, solve disposal problems p. 21

Household detergent test-sold in Southwest; sudsless; prime target: automatic washers p. 25

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Chemical Industries Week

March 3, 1951

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North or South?

To THE EDITOR: In reading your issue of February 10th, I noted your article on page 17 regarding Primary Beryl. In the heading at the beginning of the article, reference is made to the "Black Hills of North Dakota." The Black Hills are located in South Dakota and in fact your article refers to Rapid City, South Dakota.

It is a curious fact that this is a common error in which the Black Hills are referred to as being in North Dakota.

P. E. LANDOLT
Vice-President
Lithium Corporation of America, Inc.
New York City

A sharp rebuke to CIW's research editor, now sulking in a corner boning up on Rand, McNally.—Ed.

Silicone Finishes

To THE EDITOR: . . . Your article on Silicone Finishes (Jan. 20) represents an excellent job of reporting in that you emphasized their disadvantages as well as their advantages. It is unfortunate that materials which have such excellent heat stability and chemical resistance must be so expensive.

As long as this condition exists, I am afraid that their use will be limited to special fields where these properties are required.

PAUL H. SCRUTCHFIELD,
Consulting Chemist
Hannibal, Mo.

Captive Chlorine

To THE EDITOR: . . . we have the answer to small chlorine users . . . The particular need expressed in CIW (Feb. 3) has existed in foreign countries for years, and so our corporation has been furnishing small caustic soda and chlorine plants to India, Pakistan, Egypt, and China, and South America since 1940.

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B. C. MEYERS
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Allelithrin Research

To THE EDITOR: I have read with much interest the article "USDA research pays off: Army adopts allelithrin; higher output on the way" (Jan. 27 issue.)

The article is very well prepared and accurate as to details.

F. B. LAFORGE
Chemist
United States Department of
Agriculture
Beltsville, Md.

CIW's thanks to Reader LaForge, one of the pioneers in allelithrin synthesis.—Ed.

Major Reports

To THE EDITOR: . . . I have been a reader of *Chemical Industries* for many years and have been one of its strongest supporters. I have also had the personal pleasure of doing an article for you ("Mildew-Proofing Compounds") several years ago. Therefore, I feel like one of the family, when I accept the invitation in your January 20 editorial to be frank about "C. I. Week."

Frankly, I shall miss your C. I. Reports and other feature articles. The Reports were the best of their kind in this field. I can understand the popularity of "quickie" articles but I think that C. I. was always well balanced with both the long and the short.

I hope that in at least one issue a month you will find space for a C. I. Report or similar feature articles.

S. S. BLOCK
Assoc. Professor
University of Florida
Gainesville, Fla.

Let Reader Block fear not. CI Reports will be continued on a once-a-month basis.—Ed.

Air Pollution

To THE EDITOR: I was very much interested in the story on page 35 (Feb. 3) about the air pollution legislation before our State Legislature. Since Senate Bill No. 9 was introduced, a public hearing was held on

this bill and certain features of it were opposed by representatives of Oregon industries.

As a result of this hearing and several further meetings, the attorneys for some of the industries opposing this bill were asked to draft a substitute measure. The substitute measure, according to my best information, has been prepared. Just what will develop from this move, is yet to be seen

CHESTER K. STERRETT, Manager
Industries Department
Portland Chamber of Commerce
Portland, Oregon

Historical Data

TO THE EDITOR: I am gathering material for a brief history of the firm of Eimer & Amend, now a hundred years old and a division of Fisher Scientific Company, and I am writing to ask your help and that of the readers of CIW.

This old firm was close to, and played an important role in, a great many of the significant chemical developments of the century of its life. Mr. Edison's laboratory and those of Dr. Chas. F. Chandler, both at Columbia University and in connection with his work as head of New York's Board of Health, depended largely on both chemicals and apparatus from E&A.

There are no doubt many other similarly important and interesting services that the firm rendered.

I am anxious to get together as much material on this subject as possible covering the period before 1900. I would value and treasure old catalogs, bills, letters and similar materials. The loan of such material with permission to photostat it would be greatly appreciated and acknowledged in the final published history.

Any help that you & CIW readers can give me will be appreciated.

D. H. KILLEFFER
168 Westchester Ave.
Tuckahoe 7, N. Y.

CIW is glad to pass along this request from technical author Dave Killeffer (Genius of Industrial Research, etc.), hopes that readers will assist him in his quest.—Ed.

CIW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible. Address all correspondence to: The Editor, Chemical Industries Week, 330 W. 42nd St., New York City.

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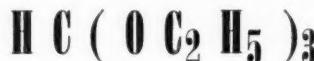
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$\text{HC(OC}_2\text{H}_5)_3 + \text{CH}_2(\text{CN})_2$ Malononitrile	► $\text{C}_2\text{H}_5\text{OCH} = \text{C}(\text{CN})_2 + \text{HCOOC}_2\text{H}_5$ Ethoxymethylene Malononitrile
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NEWSLETTER

More chlorine and caustic in the Southeast is promised by early next year. Mathieson Alabama Chemical Corp. (a new subsidiary set up and financed much like Mathieson Hydrocarbon) will build a mercury-cell plant near Mobile, Ala.

Size of the investment—\$10 million—indicates a minimum capacity of 100 tons a day. Plant will be built on a site at the McIntosh Salt Dome, 40 miles north of Mobile. Blaw-Knox will build the plant and power will be purchased.

Latest word on hafnium (p. 19, this issue): Although production processes, hitherto undisclosed, are quite similar to laboratory methods described by CIW, two modifications are incorporated in larger-scale output. (1) Chlorides of hafnium and zirconium are separated by fractional distillation. (2) Hafnium tetrachloride is converted to the oxide, rechlorinated to the tetrachloride, reduced with magnesium. Final steps—formation of tetraiodide and hot-wire deposition—are the same.

Jefferson Chemical Co. hopes to complete a new alkyl phenol unit before year's end. Its alkyl phenol—which finds its way into nonionic detergents, lube additives, plasticizers, etc.—has been made on pilot-plant scale at the firm's Austin, Texas, laboratories. The commercial-size unit will be at Port Neches.

Competition for carbon black makers is promised by a joint undertaking of Horizons, Inc. (Cleveland), Pittsburgh Plate Glass Co. and J. M. Huber Corp. (New York). The former firm controls a 15-million-ton deposit of wollastonite (natural calcium silicate) and the latter two can make a similar synthetic product. The three firms will cooperate in promoting the material, which has a particle structure much like carbon black's, is cheaper.

Another chemical firm-oil company marriage will soon be consummated in Canada. Shawinigan Chemicals Ltd. and British American Oil Co. Ltd. are quietly forming a jointly owned petrochemical company. Plans are well advanced for a plant to be constructed in Montreal. Process and products are still under wraps.

You can soon expect to see a third firm—in addition to Carbide and Carbon and Benzol Products—producing allethrin. This company, deep in the insecticide business, has applied for a certificate of necessity for an allethrin plant.

Designed to extend rubber supply, a new synthetic rubber, GR-S-X, is now being put into production by the Reconstruction Finance Corp., owner of the Government's rubber facilities. It is a tough, highly viscous cold rubber to which are added readily available rubber-processing oils. It can often replace GR-S.

Aimed at curbing the Food and Drug Administration's power, a bill (H. R. 2383) introduced by Representative Doyle (Rep., Calif.) would let Congress rather than administrative agencies interpret the multiple seizure provisions of the Federal Food, Drug and Cosmetic Act.

Doyle says his bill would provide a remedy against abuses of the law by Federal agencies—particularly the Food and Drug Administration.

More calcium carbide for an acetylene-hungry economy: UCC's Electro Metallurgical Division will double capacity at its Ashtabula, Ohio, plant. This is in addition to capacity added by its recent leasing of the government-owned carbide plant there. When the new unit is completed Ashtabula will be able to turn out 300,000 tons of carbide a year.

More surface sulfur? Freeport Sulphur Co. has been granted an option (which cost the company \$50,000) on 7,700 acres of Virginia Iron, Coal & Coke Co.'s pyrrhotite-bearing land in Virginia. Pyrrhotite is a complex iron sulfide.

Option runs until May 18, with provision for renewal. Freeport will use the time to evaluate possibilities, will pay \$2.5 million if it decides to buy.

Basic Magnesium is for sale. The \$114 million wartime plant was bought by the State of Nevada from War Assets Administration in 1948, with an arrangement whereby annual payments are regulated according to rentals, most of which have come from such chemical companies as Stauffer, Western Electro-Chemical, U.S. Lime Products, and National Lead. Plant will be sold to present leaseholders.

Tax revenue is probably behind the decision to sell. With title in hands of private firms, over \$1 million will be added to the tax rolls.

Natural hormones are being extracted from plants by U.S. Department of Agriculture scientists, who are studying them with an eye to practical use.

Growth of some plants has been accelerated simply by applying the crude materials to portions of the plants; and USDA officials are hopeful that the results indicated by preliminary experiments will lead to higher crop production.

Quality and quantity of petroleum products will be reduced as little as possible in the event of all-out war, if Petroleum Administration for Defense has its way. But PAD spokesmen pessimistically predict that this won't be an easy job.

Two good reasons: There is far less surplus crude oil production and refining capacity than existed in 1941; and military needs are far higher.

Fertilizer control bills are now under consideration by eleven state legislatures and the Federal Congress. Many of the state bills call for inspection fees, loosen the definition of fertilizer to include more materials, call for prohibition of certain ingredients, etc.

The Congressional bill (CIW, February 17, 1951) is conceded no chance of passage by Washington experts. The USDA has never backed similar proposed legislation in the past, feeling that state regulation is adequate.

Control over tungsten is now complete. Tungsten metal and other tungsten products have been under Federal control since January by virtue of NPA's M-30 order, but now Defense Mineral Administration's MO-4 order provides that tungsten concentrates can be delivered only on instructions from DMA.

Domestic antimony producers, palms outstretched for a subsidy, tell DMA that an adequate price level would jack up production to meet military and civilian needs. Practically no metal is available and inventories are low.

NPA is forced to assure supplies for military items by controlling buying, selling and use of the metal through a compulsory inventory reporting system.

... **The Editors**

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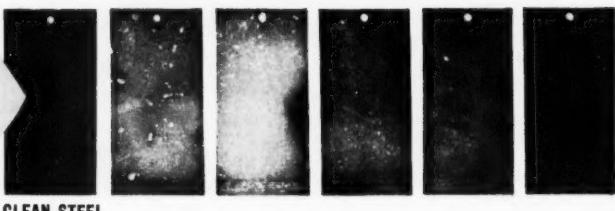
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About "Luminograms"

Test panels shown here were coated with mineral oil and then immersed in the cleaning solutions at 140° F for 10 minutes. When photographed under ultra-violet light, fluorescent oil residues invisible to the naked eye show clearly as white or grey areas, in proportion to the amount of oil residue on the panel. A perfectly clean panel, obviously, photographs black under ultra-violet light.

REMOVAL OF MINERAL OIL FROM STEEL 10 MINUTE IMMERSION AT 140° F

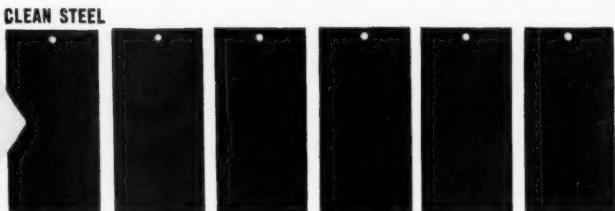
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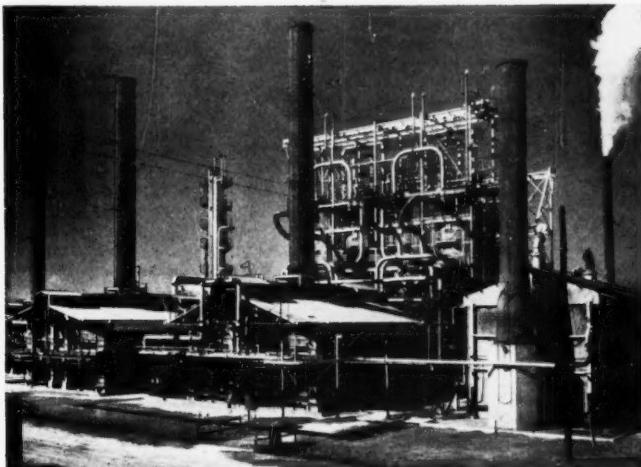
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WHAT'S NEW . . .



PETROLEUM HYDROFORMER: Phthalic users see a silver lining.

Short Wait for Phthalic

Current phthalic anhydride demand exceeds production capacity, and non-defense users will have to scramble for supplies . . .

But completion of Barrett's new phthalic plant before year's end will boost U.S. capacity by 25 million pounds—or 10%.

More raw materials—naphthalene from coke ovens and ortho xylene from petroleum—will provide for higher production within the next two years.

To hard-pressed users of phthalic anhydride, living from shipment to shipment, came welcome news this month that more production is on the way.

Barrett Division of Allied Chemical and Dye started the ball rolling with a contract award of \$4.5 million for a new plant in Chicago. Estimated annual capacity of the new plant will be 25 million lbs., a 10% boost to the overworked present national capacity. But until the plant is completed sometime around the end of 1951, there will be plenty of anxious moments for many non-defense consumers.

For a better idea of the situation

in phthalic today, comparison of production figures for 1950 with recent years is revealing. Production in 1950 was 212 million pounds, compared with 150 million in 1949, and 160 in 1948. This represents a 40% jump in one year—thanks in part to rising military needs. Spurred by rapidly increasing demand, Barrett's building plans will win the acclaim of government, customers, and stockholders alike. If military requirements should suddenly be revised upward, today's shortages will become a lot worse before this new production can take effect.

Naphthalene: Most important raw

material by far is naphthalene, by-product of coking operation, and accounting for over 90% of all phthalic produced today. It is not surprising, therefore, that Barrett, a leading coal tar distiller, will also use naphthalene.

Total domestic crude production was approximately 300 million pounds in 1950 compared with 165 million in 1949 and 222 million in 1948. CIW estimates that, given sufficient economic incentive, 400 million lbs. are potentially recoverable from existing coking and tar distilling facilities. Within the next few years a 20% projected expansion in the steel industry should help naphthalene attain a 500 million pound annual output. But yearly demand for naphthalene today is hitting the 450 million pound mark.

Important factor in bridging the 150 million pound chasm between current supply and demand has been the availability of imported naphthalene. Imports (mostly from Germany and the Low Countries) in the first half of 1950 were 67 million pounds, but dropped off markedly after Korea to about 40 million in the last six months. It would not be realistic to expect continuing naphthalene imports of this magnitude. For one reason, many foreign countries are now converting raw materials into finished chemicals; even more important, foreign exporters are alert to U. S. needs, are prone to raise prices to what the traffic will bear. Besides, dependence on overseas supplies is courting trouble in the current political situation. CIW estimates that imports this year will fall to 80-100 million lbs.

Ortho xylene: Another significant component in the phthalic anhydride situation—ortho xylene—has come into greater prominence because of stepped-up benzene requirements. Since 1946, ortho has been successfully used by Oronite Chemical Co., the only phthalic producer on the West Coast. American Cyanamid, at Bridgeville, Pa., is the only producer that can operate with either raw material, although its production is derived mostly from naphthalene.

The newly expanded program for making benzene from petroleum by

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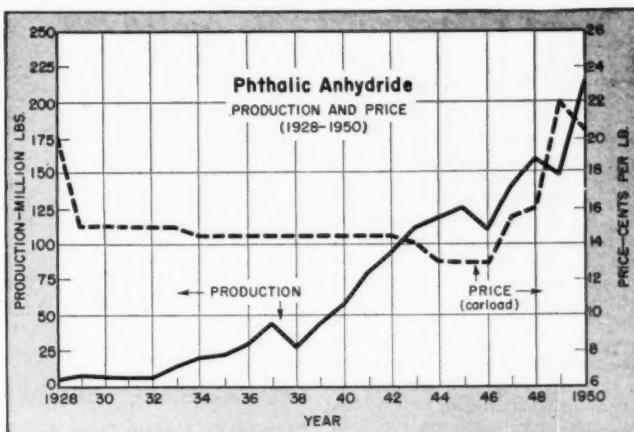
hydroforming or Platforming has an important bearing on the supply of phthalic raw materials. Within the next 15 months a number of petroleum refiners, with NPA approval, will be augmenting their supplies of aromatics; and that means considerable expansion of the concomitant xylenes. Potentially a greatly increased phthalic supply source will be available from these facilities, since ortho xylene can be separated from the meta and para isomers by fractionation.

Economics of raw materials: The choice between naphthalene or ortho xylene as phthalic feed stock is determined by time, place, and scale of operation. Coal tar processors such as Barrett, Koppers, and Pittsburgh Coke and Chemical Co. are most favorably set up to use naphthalene. Similarly, petroleum refiners who get large amounts of xylenes from their hydro-forming operations would be inclined, like Oronite, to use ortho xylene.

Any other chemical company contemplating phthalic expansion would have to decide after weighing the factors pertinent to their own circumstances. In recent years, naphthalene has been a better source because of greater availability and lower cost. However, within the last year the price of naphthalene has risen from 3½¢ to around 6¾¢ a pound as imported crude became harder to obtain and shortages developed. Large-scale purchasers of naphthalene on long-term contract are probably still paying in the 2½-3¢ range.

The price of petroleum xylene has remained relatively steady during the last five years with only a slight (but definite) upward trend. It now sells for around 30¢ a gallon, or 4½¢ a lb. Currently, large-scale contract purchasers might expect to pay 3-3½¢ a lb. although an additional ¼-½¢ would be necessary for fractionation of the ortho isomer. Substantial increase in petroleum aromatics production will undoubtedly shade these prices somewhat. Reduced costs for ortho would also follow the development of larger uses for meta and para xylenes, both of which are being pushed by Oronite. Demand for the para isomer is growing as Du Pont's Fiber V requires increasing quantities of terephthalic acid.

Process description: Phthalic anhydride is made by vapor phase oxidation of either naphthalene or ortho xylene, using a vanadium pentoxide catalyst. The reaction is exothermic and requires close control of temperature, usually maintained by a circula-



ing molten salt bath. Crude crystals are collected in chambers called "hay-barns," then vacuum fractionated to give a 99%+ product purity. The small quantities of maleic anhydride and benzoic acid also formed find a ready market.

Theoretical yield with ortho xylene is about 20% higher than with naphthalene, but plant results show a smaller pound-for-pound advantage.

In addition to the usual fixed-bed process, Sherwin-Williams successfully uses a fluid catalyst in a plant making around 2½-3 million lbs. phthalic annually. Using an improved vanadium catalyst developed in Germany, this plant claims better heat control and higher yields, although catalyst loss is a problem.

Price trends: After development of the vapor-phase process for phthalic anhydride in 1916, the price fell (as shown in the graph). Recently increasing shortages and higher production and raw material costs boosted consumers' bills even with increased production.

Early in 1950 price per lb. dropped rather abruptly from 20¢ to 16¢ as producers anticipated a weakening market. When the opposite proved the case, the figure bounced back by the end of the year to 20-21¢, where it will presumably be maintained for some time by the Office of Price Stabilization. West Coast prices have tended to be 1-1½¢ higher than east of the Mississippi.

Pattern of end use: No significant change in the phthalic end-use distribution has been evident since World War II beyond a general overall increase. The pattern in 1950 was essentially as follows:

Use	Percent	Lbs. Required (Millions)
Alkyd Resins	55	123
Plasticizers	30	68
Dyestuffs	10	23
Miscellaneous	5	11
Total	100	225 (cap.)

Consumption: Use of phthalic alkyl resins for protective coatings is steadily rising, even with added competition from maleic anhydride alkyls and more extensive employment of drying oils in modified phthalic formulations. This category should continue to flourish, either in a civilian or military economy. Phthalate esters have earned an outstanding place as plasticizers, particularly for vinyl resins. As vinyls go—and they have been going very well—so goes the phthalate plasticizer business. The rapid growth of non-plasticized polyethylene may eventually threaten some bullish vinyl trends, but probably not for some years.

It is reasonable to expect a continued growth in dyestuffs derived from phthalic, including anthraquinone and phthalocyanine dyes.

Future developments: In a long range appraisal of the phthalic anhydride picture, a five year seller's market would be a pretty good assumption. Some of the phthalic consumers will find life somewhat harrowing in 1951, but with increased production next year some happier days are in store. For those adept in time-bidding, definite improvement in phthalic raw material supplies of naphthalene and ortho xylene will be forthcoming within the next two years. And in the long run greater abundance of raw materials and competition should satisfy the budget balancers.

Fluoro Flurry

A simple, efficient, electrochemical process for the synthesis of organic-fluorine materials is opening a wide new area for industrial development. Patented only a few months ago, this process promises to bring a myriad of novel organic fluorides into the range of general industrial utility. Most intriguing, and possibly most significant of the fluorine-containing organics, are the fully fluorinated (perfluoro) compounds. Perfluoro ethers, fully fluorinated hydrocarbons and amines, etc., are endowed with an assortment of properties that cannot fail to fascinate the chemist and engineer.

Perfluoro compounds are chemical extremists, characterized by very low refractive indices, dielectric constants, and surface tensions. On the other hand, they have very high compressibilities, thermal expansions, heat stability, and coefficients of viscosity. Fully fluorinated acids are as strong as mineral acids, and their salts are easily soluble in water. As a group, the perfluoros are free of toxicity, uniformly non-reactive, and resistant to acids, alkalies, and oxidizing agents — even at elevated temperatures.

Peculiarity of this repertoire is underscored by comparison with traits of the more familiar hydrocarbons and derivatives. Despite the close structural analogy (perfluoros have the same carbon skeletons, but possess a fluorine atom for every hydrogen in conventional organics), fluorocarbons, perfluoro ethers, amines, etc. differ drastically from their hydrocarbon derived cousins.

Nature of the bond: Behavior of the perfluoro family is a result of the nature of the carbon-fluorine bond, and the electron configuration of the fluorine atom. Essentially covalent, the C-F bond is much stronger than the C-H linkage, and free of dipoles. In addition, the C-F bond distance is not much greater than the C-H—surprising when the relative sizes of the F₂ and H₂ molecules are considered.

Combination of a carbon atom and a fluorine produces a non-reactive, closed electron configuration. When the organic skeleton is completely fluorinated, the molecule is apparently well saturated electrically and exerts a very weak attractive force on its neighbors. Result is a brand new range of industrially-valuable liquid properties to delight the heart of the engineer.

High compressibility, extreme heat stability coupled with an inert, non-corrosive nature point to uses as shock absorbers, hydraulic fluids, coolants,



NELSON W. TAYLOR: Prices will fall as production rises.

manometric fluids, etc. High coefficient of thermal expansion indicates application in temperature control devices. Low dielectric constant point to liquid dielectrics, and high breakdown potentials of the perfluoro gases make them a good bet for gaseous insulators. Fluorocarbons in the form of films and surface treating compounds are water repellent and also repel a good many organic liquids. Fully fluorinated materials, especially higher amines, are generally insoluble in common organic solvents and should be useful extraction agents.

Needed—a process: Potentialities of the perfluoro group were realized some years ago, but it remained for a practical process to stimulate industrial interest. The electrolytic method filled the bill. Invented by Prof. Joseph H. Simons of Penn. State College, a leading figure in fluorine chemistry for more than 20 years, the process facilitates fluorination of organic molecules containing as many as 20 carbon atoms. In operation, organic material and anhydrous hydrogen fluoride are fed into the electrolytic cell and current applied. Process is continuous; products are removed as they are formed.

Beauty of the electrochemical method is its wide application to the preparation of a host of organic fluorides. By previous methods, mode of synthesis depends upon the final product; different reaction conditions are required for each end substance. A plant

PICTURES IN THIS ISSUE:

Cover (bottom), 29—Lynn Crawford; 9—Robert Yarnall Richie; 15—Roger Dudley; 31—Wide World.

based on one of these older processes would need major revamping to switch to another product. In the electrochemical process, chief variable is the raw material. Same cells with minor adjustments can be used for making many different materials, depending upon the starting organic compound.

Into the pilot-plant: Minnesota Mining and Manufacturing Co. became interested in the electrochemical process in 1943. After the war, a 2,000-ampere cell was installed in the company's St. Paul, Minn., pilot-plant, and fluoro chemical research went into high gear. Products of this pilot-plant were soon undergoing intensive scrutiny with an eye toward commercial development. Such compounds as anhydrous trifluoroacetic, heptafluorobutyric, perfluoropropionic acids, fluoriform, tetrafluoromethane, hexafluoroethane, and several perfluoro tertiary amines were studied at Minnesota Mining's labs and supplied to interested firms.

Although today's prices for perfluoro chemicals are stiff, Nelson W. Taylor, overseer of the company's fluorine research, is quick to emphasize that drastic reductions are in the offing when commercial production gets into stride. While present prices are no indication, it is unlikely that the cost of any of the perfluoro group will drop to less than \$1 a pound. However, this is no higher than the prevailing price of many organics.

Minnesota Mining and Manufacturing is not alone in fluorochemicals, but it is the outstanding name in the perfluoro field. Du Pont's fluorochemical representatives are Freon halocarbons (containing both fluorine and chlorine), Teflon polymer (polyperfluoroethylene), and perfluoro kerosene. Dow's entry is ethyltrifluoroacetate. Hooker Electrochemical has Fluorolubes and sodium trifluoroacetate. General Chemical Div. (Allied Chemical and Dye Corp.) is in with Genetrons (partially fluorinated hydrocarbons), and M. W. Kellogg with Kel-F polymer (polytrifluoroethylene). Pennsalt makes a number of fluorocarbon intermediates.

Commercialization of the perfluoros is only now beginning as most activity up to this point has been centered on basic research. At present, Minnesota Mining and Manufacturing Co. is producing in pilot batches, but commercial output may not be far off. A semi-works plant, now going up near Hastings, Minn. (to begin operating June 1, 1951), is a good sign that perfluoro chemicals are outgrowing their short pants.

Still More PVP

While General Aniline and Film Corp. and Commercial Solvents Co. were publicly taking the wraps off their heralded plasma "substitutes,"* a major pharmaceutical firm, quietly—but no less efficiently, went about the task of getting its own product off to a good start. In an exclusive interview with CIW, Schenley Laboratories, Inc.'s, executive v.p., General E. F. Jaffe, and medical director, Dr. Charles E. Dutches, clarified their company's position in the expanding new field.

Schenley produces a plasma "substitute" called PVP-Macrose, based on the synthetic polymer, polyvinyl pyrrolidone. Like General Aniline and Film, which also has its hopes on PVP (CIW, Jan. 20, 1950), Schenley settled on the polymer after a close study of the original German experience with the substance. Unlike GAF, Schenley does not have the facilities to make the monomer (vinyl pyrrolidone) and is forced to import it from Germany. Final product, however, is processed and formulated in its Lawrenceburg, Ind., laboratories.

Schenley is stockpiling PVP against the day the German material becomes unobtainable. Its efforts have been successful to the point where material for more than 6 million bottles of PVP-Macrose will be on hand before summer. Large-scale shipments will be possible early in the summer when production is expected to be at the rate of 350,000 units (pints) per month.

A domestic supply of PVP would sit well with Schenley. The company has approached General Aniline and Film (only American manufacturer of PVP) on this score, but it is dubious whether GAF will fill any additional orders before it substantially increases its present 1,000 pound-a-month productive capacity. General Aniline's PVP unit at Grasselli, N.J., is now buzzing along, and if plans to jack PVP output up to 30 tons a month (by Jan., 1952) are successful, there will be more than enough to go around.

10,000 bottles of PVP-Macrose have been delivered to the armed forces for evaluation. The National Research Council has the job of appraising the product for military purchase. But the biggest potential market is the civilian population which, in the event of atomic attack on a major city, would need millions

* These materials cannot duplicate the many physiological functions of human plasma. Their purpose is merely to increase the volume of vascular fluid.



CHARLES E. DUTCHESS: PVP—Macrose, synthetic life insurance.

of pints of plasma (in one form or another). PVP-Macrose is one good reason we won't be caught short.

Flying Foam

A combination of GR-A (butadiene-acrylonitrile) synthetic rubber and nylon is foamed to eight times its original volume by thermal decomposition of azodiisobutyronitrile to provide a light, strong filler for steel propellers.

Called HS 60, the new rubber

formula was developed by Hamilton Standard division of United Aircraft Corp., East Hartford, Conn. The liquid composition is heated to 300 F., whereupon it foams up to eight times its original volume. When cooled the resulting mass is a light, rigid sheet (25 lb./cu ft) of extraordinary strength.

Adds strength: The sheet—actually a hard sponge—fills the cavities in hollow steel propeller blades to support the core and shell. It must resist tremendous twisting and pulling forces, keep the shell from vibrating, and support it against blows of stones.

Also, it must be so compounded that it will stay in place under high centrifugal force. And above all, it must be light—the primary requirement that led to the choice of a foamed rubber as filler material. The cavities in a single blade of a Boeing Stratocruiser's 16½' propellers, for example, add up to 720 cubic inches and are filled by less than 11 pounds of rubber foam.

Hamilton Standard claims important advantages for its new product as compared with previously used materials: three to four times more impact resistance; greater tensile and fatigue strength; higher torque resistance; easier to process; better temperature control during the foaming step. A 25% saving in processing time alone has resulted.



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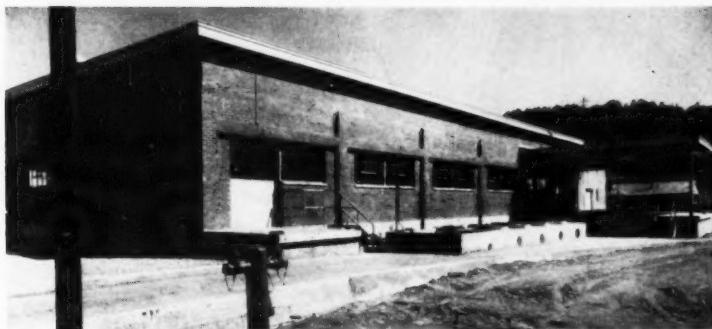
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PACKAGING



NEW RECONDITIONING SHOP is capable of handling 1200 drums a day.

Rejuvenated Drums

The high price tag and shortage of new drums moved Standard Oil of California to build its new reconditioning plant at the Pt. Wells (Washington) distribution plant. Both management and employees agree the new shop is a big improvement over the former makeshift facilities.

First step in the reconditioning process is the "outside" wash with caustic soda. The next step is the important "inside" wash. This is accomplished by spraying reused water into the drum, then hot cleaning agent, and, finally, a rinse with hot water.

Next the barrels are preheated and painted. The preheating serves to speed up drying. After the final operation of labeling, the drums are ready to be shipped and reused—as "good as new."



DRUMS ARE SORTED before "outside" wash. Dirtier drums require longer wash cycle.



"INSIDE" WASH is handled by four men. "Outside" wash cabinets are shown in background.



LABELING IS FINAL STEP in the reconditioning operation.



The sanitary can—most famous of all metal containers—made commercial canning of fruits and vegetables possible—revolutionized the grocery business—changed America's eating habits.



The "Double-Tite" paint can expanded the paint business—brought ready-mixed paints to millions by making it practical for these paints to be packed and shipped everywhere.

CONTAINERERS . . . to help people live better



The vacuum-pack coffee can—permitted roasters to protect from roaster to consumer the flavor and aroma of fresh-roasted coffee.



Canco's Paper Milk Container—gave tremendous impetus to store milk sales for dairies all across the country—allowed grocers to give housewives milk in a sanitary, easy-to-carry, one-way container.

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In the distributing industries, Canco's pioneering will continue to pay dividends in easier, safer, and more

Canco Pioneering

LEADERSHIP IN THE DAYS AHEAD.

economical handling of packaged goods.

And to everyone who eats, patronizes a drugstore, drives a car, maintains a home, serves in our armed forces—Canco's pioneering will continue to make possible a myriad of products . . . of better quality.

As we look ahead with determined resolve to the next half-century, we affirm this steadfast purpose: *Canco will contribute even more* to industry and government, and bring even better living to even more people.

On this page are familiar containers of today pioneered by Canco.



The meat can boomed the canned meat business—provided housewives with a new and wide variety of readily prepared meats.



An adaptation of the sanitary can, this container assured motorists of getting refinery-sealed motor oil. Gave huge boost to sales in service stations in every state.

Can Company

CANCO

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The beer can trademarked "Keg-lined"—the first non-returnable container for beer and ale—brought new conveniences to beer drinkers everywhere—lowered distribution cost.



This container protected first-aid units of blood plasma in World War II. An adaptation of Canco's tennis ball can.



The salt container prevented excessive caking which took place in the old-fashioned bags. The aluminum pouring spout made easier the housewife's task.

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RESEARCH . . .

Pure Hafnium Arrives

First commercial production of pure hafnium metal has been accomplished by the Foote Mineral Co.

Industrial applications today are few, but greater availability will open the door to research and development.

AEC's disclosure two months ago, that Oak Ridge has succeeded in producing metallic hafnium, brought sly smiles to the faces of S. C. Ogburn, Jr.* and F. M. Litton* of the Foote Mineral Co. They had done it for the Air Force almost a year and a half earlier, but were pledged to silence until this week.

Two years ago, Air Force metallurgists became interested in the possibilities of zirconium and hafnium as aircraft construction materials. Their light weight and refractory properties made for intriguing speculation on potential aviation uses. As no appreciable amounts of the metals were to be had, the Air Materiel Command at Wright-Patterson commissioned Foote Mineral to undertake research on the production of the pure metals.

There is plenty of zirconium available, but pure zirconium is another story. Zirconium and hafnium are the Damon and Pythias of the chemical world. Wherever you have zirconium, you can be sure of anywhere from 1%-7% hafnium as impurity. The two metals are closely related physically, and to make matters worse, every chemical reaction exhibited by one is almost exactly duplicated by the other.

Close chemical similarity of hafnium and zirconium is easy to understand when electron configuration and the relative positions of the two elements in the periodic table are taken into consideration. Both are group-four transition elements, zirconium falling in the fifth series and hafnium in the sixth. Both have two valence electrons in the outer energy shell, and two in the next inner energy subshell. Also, despite the relatively large difference in atomic weight, the radii of the two atoms are almost the same. Separating the two is a problem that has ruined the happy disposition of many a zealous researcher.

It was immediately obvious that any method used to "open" zirconium minerals would result in the inclusion of appreciable amounts of hafnium in

solution. Briefly, the problem was resolved as follows. Salts of zirconium-hafnium minerals are fractionated by precipitation and crystallization techniques¹ to give a rough separation. Next, the salts of the respective metals are reduced with sodium to give the crude metals. As a result of its high melting point, hafnium is not readily fused to the massive state; an alternate method was needed.

The hot-wire technique was the answer. Crude hafnium is heated in an iodine atmosphere to form hafnium tetraiodide. At 600°C the tetraiodide vaporizes. If this vapor is brought into contact with a tungsten filament at 2000°C, hafnium metal deposits on the filament. The hafnium thus obtained is used to prepare more of the tetraiodide, and the process repeated until highly pure, bright, ductile hafnium filaments are produced.

Hafnium is a soft, pliable metal which can be cold rolled, hammered, or drawn into wire. Its high reactivity makes deoxidation a virtual impossibility. Traces of oxygen and nitrogen are easily absorbed by the metal, ruining its malleability. When the cold metal is annealed, its electrical properties are noticeably altered by reaction with these gases.

Hafnium is a good electron emitter and shows promise of finding use in electronic equipment, x-ray tubes, etc. It might even prove a superior filament in incandescent lamps if high melting point is any criterion. The metal is valuable in the reduction of tungsten oxide, and should make possible the formulation of many alloys suitable for high temperature electrical equipment (i.e. resistance heating elements).

Elemental hafnium is brand new, relatively high-priced, and still quite scarce. Although its commercial potential is still a question mark, greater availability will open a previously impossible avenue to the industrial researcher.

* Manager of research and project leader, respectively.

¹ A simpler method of separation developed by R. S. Hansen of Iowa State College makes use of the discovery that a silica gel column will adsorb hafnium tetrachloride from a holic solution, but pass zirconium tetrachloride.



OGBURN AND LITTON: Hafnium on a hot wire.

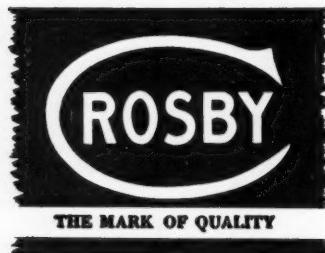
Nuclear News

Atomic Energy Commission's new Brookhaven reactor is now available to industry for radioisotope production. It makes possible the preparation of radioactive materials with higher specific activities than are available from Oak Ridge.

As a result, Brookhaven will be more or less a custom radioisotope producer, concerned chiefly with requests for highly potent materials with half-lives too short for distance shipment. High radiation flux and special equipment built into the reactor allows production of the souped-up isotopes at a considerable time saving.

The new unit is the most efficient job of its kind to be found anywhere, able to handle a larger number of simultaneous samples than any other known reactor. Conveyor chain of 300 aluminum tubes transport specimens to proper locations within the reactor and discharge them without disrupting operation. Pneumatic messengers deliver finished products to labs.

Despite the new facilities, Oak Ridge will remain the nation's principal radioisotope source, and all requests for radioactive material will still be sent to Oak Ridge. Service irradiations will not be performed at Brookhaven unless authorized by the Isotopes Division (Oak Ridge). Price of radioisotopes and irradiation services will be patterned on the policy now in effect at the older reactor. In the case of special irradiations, charge is based upon the magnitude of neutron flux and the exposure time.



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RESEARCH

Phosphite Debut

Two new additions to Virginia-Carolina Chemical Corp.'s group of alkyl phosphites point up the interesting and commercially valuable properties of these organic phosphorus compounds. No large-scale industrial use is evident at this stage, but greater availability should pave the way to a better appreciation of their potentialities.

Diethyl, dibutyl, triethyl, and tributyl phosphites were previously available from Virginia-Carolina in limited quantities; di (2-ethylhexyl) phosphite and tri (2-ethylhexyl) phosphite are the newcomers. These relatively unfamiliar compounds show a good deal of promise in a variety of applications.

As additives to lubricating oils, they make good corrosion inhibitors, stabilizers, and anti-oxidants. In extreme pressure lubricants, they improve viscosity, penetrability, and load carrying capacity. Some of the phosphites are useful as cellulosic stabilizers and plasticizers. High solvent action with organic materials is another technically useful attribute.

Phosphorus injectors: But these alkyl phosphites really shine as intermediates in the preparation of many organic phosphorus compounds. Selective reactions which they exhibit with organic and inorganic reagents provide a convenient means of injecting phosphorus into many molecules.

Although unreactive with oxygen and sulfur, the dialkyl phosphites combine readily with chlorine and bromine to form dialkyl halophosphates. The hydrogen atom of the dialkyl phosphites cannot be replaced by base, and is not acidic in the conventional sense. However, the alkali salts are easily made by reaction of the ester with the metal. Unlike the free ester, these salts add sulfur to give the thiophosphates. Alkali salts (especially sodium) react with primary and secondary alkyl halides, providing a convenient route to phosphonate esters and phosphonic acids. The salts combine with halophosphites to give pyrophosphites, and with halogens to yield hypophosphites.

Trialkyl phosphites are in general sensitive to the same reagents as the dialkyls, with one noteworthy exception: trialkyls are oxidizable with oxygen and sulfur to give the trialkyl phosphate and thiophosphate, respectively. The trialkyls differ further in that their hydrolytic stability increases with increasing molecular weight; just the opposite is true of the dialkyls.

Commercially the phosphite esters

are most significant as new tools for the synthesis of a variety of organophosphorus materials, which ultimately take the form of dyestuffs, insecticides, pharmaceuticals, oil additives, and plastics.

Heart hope: Sodium gentisate looks like the best thing yet for treating rheumatic heart disease, according to Dr. Norman E. Clarke, noted heart authority. The chemical is effective even in late stages of the disease, and holds the hope of dealing a telling blow to this childhood killer.

Golden emulsion: Addition of minute quantities of gold salts to ordinary silver bromide emulsion is reported to increase the sensitivity of X-ray plates by as much as tenfold. Gold favors formation of the latent image at surface emulsion grains, rather than hard-to-get-at interior.

New B_6 synthesis: Reduction of carboxyl groups in the 4 and 5 positions on the pyridine ring has been the chief headache in the established synthesis of vitamin B_6 . Accepted procedure was to convert the carboxyls to nitriles and catalytically reduce the latter to aminomethyl side-chains. Further treatment with nitrous acid resulted in the desired hydroxymethyl groups.

Now, thanks to R. G. Jones and E. C. Kornfield of Eli Lilly Research Laboratories, the whole sequence is simplified to one step by reduction of carboxylic esters with lithium aluminum hydride. Yields are excellent and should bring about a reduction in the cost of the vitamin.

Battery rejuvenators are the bunk, according to the Bureau of Standards. A new pamphlet, *Battery Additives*, describes tests showing that the so-called rejuvenators (i.e., magnesium sulfate-sodium sulfate mixtures) are worthless. Products of this type are now being foisted on the public to renew dead, lead-acid storage batteries.

Industrial researchers: Bernardsville, N.J., is the location of the laboratories of the newly formed Chemical Research Associates, Inc. Four chemists and engineers head up the organization, which is equipped to do research, consultation, analysis, process development, and economic and technical surveys in a variety of specialized fields. In close contact with leading European technical sources, the group will take on independent research problems, or supplement clients' facilities.

PRODUCTION . . .

Chromium Salvage

Chromium-containing ions can now be recovered economically from anodizing, electroplating and copper stripping baths.

Direct evaporation in a glass-lined still is most successful for regeneration of electroplating bath rinse water.

Ion exchange resins have proved most useful in cleaning up electrolytic solutions used for anodizing aluminum.

Today's war-caused squeeze on chromium and chromic acid supplies has created demand for equipment to recover chromium-containing ions from baths employed for anodizing aluminum, chromium plating and copper stripping.

In these processes the chromic acid rapidly becomes contaminated with aluminum, copper and other metallic cations. Until recently there has been no satisfactory reclamation process. Now there are two.

One, developed by Pfaudler Co., concentrates the chromic acid by evaporation and is most suitable for chromium plating baths. The other, proposed and developed by R. L. Costa, Mutual Chemical Co. of America, uses ion exchange. It is the method-of-choice for recovery of chromium from anodizing baths.

Evaporation: The Pfaudler system concentrates the wash water, resulting from rinsing plated objects, which contains from one to six ounces of chromic acid per gallon, to plating strength, 30-50 ounces of chromic acid per gallon. Condensate is collected as distilled water to make up future plating batches.

Evaporation is carried out batch-wise in glass-lined still at a pressure of approximately 4" of mercury. About eight hours are required to concentrate the dilute chromium solution. Particles of liquid entrained by boiling are separated by a cyclone separator. Except for the still, all parts of the apparatus are fabricated from Type 316 stainless steel. The unit, which includes a steam jet to reduce the pressure in the still, pressure regulators, and temperature and pressure indicators, is available in four standard still sizes, 200, 300, 500 and 1,000 gallons. Custom-built units up to 3,000 gallons can be furnished.

Another point important to plant operators: A system of this type greatly reduces stream pollution resulting from discard of plating baths, and at no cost to the plater. One large plant

in Flint, Mich., recovering approximately 5,000 pounds of chromic acid per month, repaid the cost of equipment in six months. At the same time the chromic acid concentration in the plant effluent was reduced from 55 ppm to about 6 ppm.

Ion exchange: The Mutual process was developed chiefly for anodizing baths. Anodizing is the production of a heavy, corrosion-resistant oxide coating on aluminum, accomplished by making the aluminum an anode in a bath with a chromic acid electrolyte. In such a process about as much aluminum is dissolved as is converted to aluminum oxide; and side reactions also produce useless trivalent chromium.

Build-up of such impurities interferes with the anodizing operation. Thus the practice has been to discard a portion of the bath and add further chromic acid. This intermittent dumping creates a high chromate content in the plant waste, which is difficult to treat.

One anodizing plant solved this problem with ion exchange. Costa found that sulfonated cross-linked polystyrene cation exchangers (Permutit Q, Amberlite IR-120, Dowex 50) would remove the metallic cations from used chromic acid solutions, and the resin is not affected at chromic acid concentrations below 150 grams per liter. Thus, with ion exchangers, it is no longer necessary to dump anodizing baths. A small portion of the bath can be treated each day to yield a constant and optimum bath concentration for anodizing. The used resin is regenerated with sulfuric acid.

An idea of the cost can be obtained from one case. A 1,000-gallon tank, containing 834 pounds of chromic acid, would normally have to be dumped when the aluminum content built up to about 90 pounds. With a cation-exchange unit, however, this bath can be treated and reused indefinitely. About 980 pounds of sulfuric acid are required for regeneration; but



R. L. COSTA: Recovers chromium with ion exchange.

cost of sulfuric acid is only about a tenth of the value of the recovered chromic acid, leaving an ample margin to cover capital cost of the equipment which must be installed.

Plating baths: Cation exchangers are also of value in recovering chromic acid from used electroplating baths. The usual 40% concentration is too strong for the resin and must be diluted to 10%-15% acid before treatment. The effluent chromic acid can then either be concentrated by evaporation or brought up to strength by addition of chromic acid anhydride.

Also, a combination of a hydrogen exchanger and an anion exchanger can be used to recover chromic acid from the rinse water. But evaporation must be employed to concentrate the chromic acid for reuse.

Rinse water: To yield a clean surface after anodizing, electroplating, or copper stripping, it is desirable to use a rinse of running water which is sometimes preceded by a fixed water rinse. These rinses pick up chromate concentrations of 10 to 1000 ppm, small when compared to the quantities of chromates released when the bath is dumped but still serious. U. S. Public Health Service limits the chromium content for drinking water to 0.05 ppm.

Anion exchange has been developed by the Permutit Co. to recover the chromate ions from the rinse water for reuse. Although this idea was tried during the World War II, it was not until the development of Permutit S that an anion exchanger was available that could withstand attack by chromic acid.



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PRODUCTION . . .

In operation the rinse water is passed through the bed of Permutit S. The resin is then regenerated with caustic soda. Chromic acid is recovered from the sodium chromate solution by passage through a Permutit Q hydrogen exchange unit. The dilute chromic acid is concentrated for reuse by evaporation. A plant using the combination ion exchange-evaporation process is now under construction in the Midwest.

One or a combination of the above procedures can undoubtedly solve almost any chromic acid recovery or waste disposal problem. And it can be done at a dollars-and-cents saving.

More Sulfur

New sulfur reclamation plants are the order of the day. The most recent is Noranda Mines' \$4 million plant for production of sulfur from pyrites at Hamilton, Ont., the Pittsburgh of Canada.

Elemental sulfur (50 tons a day) is not the only product. An iron oxide sinter (100 tons a day), a blast furnace charging stock, and sulfuric acid (100 tons a day) will also be produced. Hamilton and its iron-and-steel operations is an ideal location to market these products. Sulfuric acid will find a ready market for pickling steel produced from the iron oxide sinter. The sulfur can be used for production of further sulfuric acid or shipped to the many paper mills in that area.

The process recovers roughly half the sulfur content of the pyrite as elemental sulfur; the rest as sulfur dioxide for sulfuric acid.

A thick bed of ore on a traveling hearth is ignited at the top. Heat generated by the oxidation distills elemental sulfur from the layer below, leaving ferrous sulfide. Oxidation of this continues to supply heat and produces iron oxide. Close control of the amount of air passing through the bed is required to assure maximum production of elemental sulfur.

Without Jets

Earlier designs of paraffin alkylation units utilized fluid jets to mix hydrocarbon streams with the concentrated sulfuric acid catalyst. Today, jets have been replaced by mechanical agitators.

Mechanical rather than jet mixing not only produces a more efficient contact between the two phases, but at a considerable saving in total power required. For example, alkylates have been produced with a power require-

ment of only 0.028 KWH per gallon of alkylate when using mechanical agitation. For a similar reaction, using jet mixing, 0.12 KWH would have been required.

Descrappling

Scrap aluminum reclamation is becoming increasingly important. The germ of a new process is contained in the German work on using mercury.

For best results the mercury should be above the boiling point. Thus it is necessary to carry out the continuous extraction under pressure, which is provided by a hot-cold U-tube.

Before extraction the crude aluminum is wetted with mercury and passed countercurrent to the mercury. The temperature cannot be too high as selectivity decreases. After solution of aluminum, mercury passes into a cold zone to crystallize the aluminum. It appears as a silver-white magma on the surface of the mercury which contains about 10% aluminum. Pressing provides a cake containing 70% aluminum. Upon melting at 750°C in the absence of air the remaining mercury is separated. Mercury is recovered

from the extraction residue in a similar manner.

Not only does this offer possibilities for the recovery of mercury from scrap but it may be useful for production of primary aluminum from the aluminum-silicon alloy produced by electrothermal smelting of bauxite and coke.

Level Control

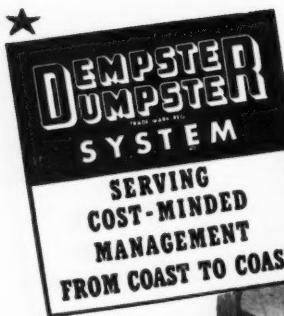
More precise level control than by either a differential type meter (mercury manometer) or a torque tube displacer is claimed by Minneapolis-Honeywell Regulator Co. for its new displacement type detector and transmitter. In operation a stainless steel cylindrical displacer moves up or down with the level. This motion acts on a rod which extends from the cage through a stainless steel sealing bellows. Vertical movement of the displacer causes the rod to rotate the yoke to which it is attached. Through a series of levers this motion acts on two bellows. One, the balancing bellows, activates the pneumatic control. The other is a damping bellows, to eliminate oscillation.

65

1

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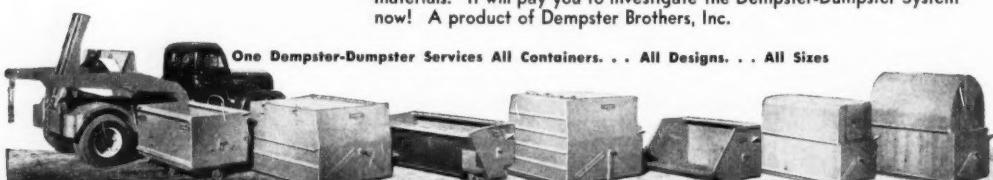
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SPECIALTIES . . .

Selling Invisible Suds

A three-month test marketing of Giant, Armour's sudsless non-ionic detergent, is now under way in two Southwestern cities. National distribution by the year's end is the goal.

Although designed for automatic washing machines, the product has many other household uses, will be competitive with Tide, Surf, Breeze, Fab, Chat, All, etc.

Armour and Co. is patiently explaining to the housewife that suds on top of the water won't remove dirt, but that Giant's "underwater suds— the suds you can't see, but can feel" will.

Psychologically, it's a tough job. Since the days of lard and wood ash concoctions, housewives and chemists alike have looked on suds as an indication that water hardness has been neutralized and the cleansing solution will hold dirt in suspension.

Putting its product into consumer hands is the first step in Armour's re-education drive. Every home in Lubbock, Tex., has received a coupon for a free box at the grocer, and door-to-door distribution of free boxes is under way in Enid, Okla. Bolstered by newspaper promotion in the two towns, direct sales will be studied over a three-month period. This test marketing will serve as a guide in planning regional and national distribution, scheduled for completion within the year.

Sudsing and swirling don't mix: Origin of the non-sudsing feature dates back to the development of the automatic clothes washer. Shortly after manufacturers began beating the drum for the new household gadget, it became apparent that all was not well with it. Engineering principles were checked and found sound. The obvious answer was that the suds weren't living up to their part of the bargain. Using the proper amount of soap for soil removal resulted in an overflow of suds, cushioning of agitation, insufficient rinsing, and gummy deposits in crevices impossible to clean. Less soap gave the familiar "tattle-tale gray."

Washer manufacturers sought a dream soap with high detergency, low suds, indifference to water hardness, complete solubility, and free rinsing. Soapers could offer little help, but chemical companies moved in with synthetic detergents. Armour researchers also accepted the challenge in 1946 and came up with their solution.

The product was an unconventional

item in 1946, being a non-ionic detergent*. Addition of a builder, a soil-suspending agent, and a fluorescing brightener completed the story. Washer manufacturers eagerly accepted the product and worked with it for three years. At present, one manufacturer uses it as a standard for tests. Additional uses were found in the textile industry, laundries, and other industrial applications.

Good as ever: Surprisingly enough, attempts by the laboratory to improve the product have failed; the original formulation stands today. A physical change has been made, however, as a psychological concession. Formerly the product was dense, but it is now fluffed up in a spray tower. With an eye for a bargain, the housewife will invariably pick a larger package—even when printed net weights are the same. An additional reason is that packaging machinery is standardized to handle the larger volume package. Giant will be marketed in the familiar 19-oz. package at prices competitive with other detergents.

Usage isn't limited to automatic washers, however. While not an all-purpose product, Giant works well in dishwashers and on floors, walls, venetian blinds, and a host of other household articles.

Taking on some giants: In moving Giant into the household detergent field, Armour is taking on some well-established competitors. One—All, the product of Detergents, Inc., Columbus, Ohio—was tailor-made to meet specifications drawn up by automatic washer manufacturer Westinghouse. Originally it was promoted with the machine through appliance stores, but it has since been endorsed by other manufacturers. On the market for four years, it now has national distribution, is sold through grocery, appliance and department stores.

Another product for automatic machines—in this case, dishwashers—



AUTOMATIC WASHER: Prime target for Giant.

is Chat, General Aniline's alkyl amide sulfonate-based product. This was introduced in November, 1946, and is now sold through appliance distributors although a few independent grocers handle it.

Probably as much of all-purpose detergents like Tide (P&G), Fab (Colgate) and Surf (Lever) is sold for washing machines as for any other household use, and their makers are not exactly apologetic about the value of the products' suds. With the "big three" successfully selling suds for automatic washers, Armour has its work cut out for it.

The consumer, of course, is the key. Armour knows it has a good product, and housewives who have used it admit it does a good cleaning job. Yet the feeling that something is missing when no suds appear is hard to allay.

More than 17 million home washing machines, an increasing proportion of the automatic type, have been made in the past five years. This is a substantial market to have as a prime target, and as it grows, identity as a companion piece to automatic washers will become more valuable each year. That will make Armour's selling job on Giant that much easier.

Giant is being made on a commercial scale in Chicago. If it clicks, it can also be made in the company's North Bergen, N. J., plant.

Cosmetics plant: Coty Inc. is building an assembly and distribution plant at Newark, Del. Bids are now being received for the one-story unit.

* Other non-ionics that have since become national retail items: Glim, General Aniline & Film's ethylene oxide condensation product sold principally for dishwashing; Detergents, Inc.'s All, based on Monsanto's Sterox (polyoxyethylene ether) and designed for automatic washers.

Superdruggist

Arner Co. is capping its current expansion by opening new labs at its Buffalo and Fort Erie (Ont.) plants this month. This private formula pharmaceutical manufacturer boosted its sales 33% last year, now boasts its production volume this year will be worth over \$20 million at the retail level.

The laboratory going into operation at the Buffalo plant will be for experimental work, while the Canadian unit will be concerned with analytical and biological testing. These are but the latest in a series of recent expansions made necessary by the company's sharply rising sales curve of the past two years. Along with general modernization of production and packaging lines, a third floor has been added to the Fort Erie plant, and a new unit of approximately 40,000 sq ft has been added to the Buffalo plant. The latter is being used principally for packaging.

More than punching tablets: Arner can put the new laboratory space to good use, for a manufacturer making drug products for another company assumes a responsibility unique in the private label business. That it has an obligation to the public as well as to its customers is obvious, but it also is criminally responsible for any deviation from the Food and Drug Administration's regulations in the manufacture, packaging and labeling of a product, regardless of whose label is on it. This means tests to check the soundness of the product idea, the quality of the ingredients and the manufacturing procedure as well as strict production control.

The company works closely with FDA, furnishing Washington with complete information on safeguards taken in certifying control and manufacturing procedures. Arner is equipped to turn out any form of drug—pills, tablets, powders, ointments, capsules, liquids—for manufacturers and distributors. Since it offers to take a product from the idea stage, if desired, through packaging and shipping, the company is approached on many novel drugs, must be able to separate the possible from the unlikely, and evaluate marketing chances as well as production problems.

Forty-two year backlog: The know-how for such an operation has been picked up over the 42 years since Fred C. Arner opened this service to the drug industry in Buffalo. Arner, then a young pharmacist and chem-



NIELS KLENDSHOJ: Medicine and machinery make volume drugs.

ist, had built his own plant in South Africa to make pharmaceutical products for an American manufacturer to sell in that country. He saw no reason why the idea could not work back in the U. S. Packing his bags, he headed home to line up contracts among private formula owners for whom he believed he had an attractive proposition.

The advantages such a service offers a manufacturer or distributor are similar to those offered by any private label organization: an entrepreneur can get into business without any sizable cash outlay or accumulation of technical personnel; the manufacturer, with many different kinds of material in production, can schedule them to keep his equipment busy, eliminating the high overhead caused by slack periods; the customer can make minimum runs to see how a new product goes, and increase it as the market expands; the formula owner can forget about production and concentrate on marketing his product.

In good hands: Two years ago, active direction of the company's fortunes passed to Dr. Niels C. Klendshoj, executive vice-president. Klendshoj, a soft-spoken scientist, is well equipped for the job. In 1927, with the equivalent of a Ph.D.* in chemical engineering from the Royal Polytechnic Institute, University of Copenhagen, in his native Denmark, he took a position as assistant chemist at Arner, swore he wouldn't stay more than a week because he "didn't like the Buffalo climate."

Though he still won't defer to that city's rough winters to the extent of giving up his habit of going hatless,

his career bears a heavy "Buffalo" stamp. In 1939 he received his M.D. from the University of Buffalo School of Medicine, and today, in addition to his industrial work, he is assistant professor of pathology and director of the Division of Pathology at the University, and director of the Biochemistry Department at the Buffalo General Hospital. Co-discoverer of blood group specific B and O substances, he has authored numerous publications in the fields of biochemistry and medicine.

Klendshoj's close connection with the scientific aspects of medicine and pharmacology is a big help in picking out unsound product suggestions and suggesting ways to modify a formula. Apart from that, he likes to brag about Arner's fine machine shop—it made even precision parts for government jet planes—which builds production units, and revamps standard models for the company's special purposes. This is no small part of Arner's success, for high-speed machines are keystones in producing and packaging drugs. And Arner last year turned out over two billion pills and tablets alone.

No basic manufacture: The company does not manufacture any of the basic ingredients going into its products. It confines its activities to compounding the raw materials it purchases.

The last two years have been banner ones, with 1950 sales topping the previous year's by one-third, and 1949's one-quarter over the previous year. Much of this increase Klendshoj attributes to the expansion of production and packaging facilities, and emphasis on high-speed precision machines for various products. Recent addition of manufacturing operations in the field of antibiotics is also contributing to the company's growth.

Formula is trade secret: A Federal court in Greensboro, N. C. ruled that Swift and Co., one of the defendants in a damage suit brought by a furniture manufacturer, did not have to answer questions on the formula, composition, and manufacturing process used in producing the glue involved in the case. This ruling was made in a hearing to determine what questions Swift would have to answer in the trial.

Two furniture manufacturers claim that glue sold by both Swift and Union Paste Co. did not perform as represented, and resulted in large damages to them.

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BUSINESS & INDUSTRY



BLUEPRINT FOR SAFETY: Cyanamid's Bill Bradley charts critical area.

Training for Disaster

American Cyanamid trains crews on disaster relief and damage control in event of atomic bombing attack.

Techniques of radioactivity detection will be taught by Central Industrial Hygiene Staff.

New duty will be another important job for hygiene staff, a key factor in company employee health program.

Within the next few weeks, American Cyanamid will inaugurate a program designed to train 24 three-man crews in the technique of disaster relief and damage control. The step is part of the company's overall plan to protect personnel and combat local panics in the event of an enemy bombing attack. Management believes that these crews, when their training is complete, will serve as the "know how" nuclei in the various plants on the subject of what-to-do-if-a-bomb-hits.

To gain a closer look at Cyanamid's program, CHEMICAL INDUSTRIES WEEK interviewed Bill Bradley, chief of the Central Industrial Hygiene Staff. Bradley's stock-in-trade is the elimination of industrial health hazards and he is preparing to take on the biggest health hazard of all . . . the atom bomb. On the shoulders of Bradley and his staff will fall the responsibility of instructing the disaster crews on the use of radiation detection equipment.

Does the program indicate the company expects an atomic attack in

either the near or the remote future? "Not at all," says Bradley. "But as long as the possibility exists, we can, and will be, prepared. Simply stated,

it's a case of being forewarned and forearmed."

Bradley adds that the program is meant to supplement any existing ones of either federal or local government. But the crews will have more equipment at their disposal than many good sized municipalities.

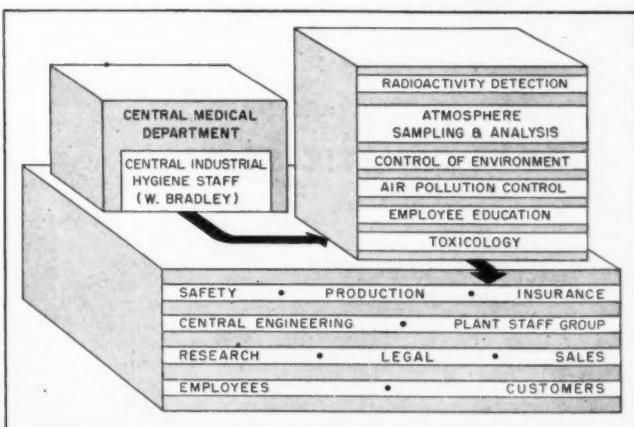
Industrial hygiene: The new duty will be an additional function for Cyanamid's Central Industrial Hygiene Staff. In its 7 year existence the department has gained wide acceptance as an integral part of the company's operations.

Actually, the staff is a four man team, captained and quarterbacked by Bradley. Each man is a specialist in one or more fields of toxicology, chemistry and engineering. But each man is a general practitioner too, in the sense that he is capable of finding and correcting the root of industrial health hazards.

Since the staff is an important part of the company-wide-employee health program, it is directly responsible to the Central Medical Department. It works through and with other company and plant staff groups (research, production, etc.) but is not hidebound by any rigorous set of regulations. It can, and often does, deal directly with the employee himself.

In addition the hygiene staff must be ever alert to the possible misuse of a product by consumers and the resulting customer complaint. In such cases the hygienist deals with the customer through the sales department.

Bradley points out that the indus-



CENTRAL INDUSTRIAL HYGIENE STAFF plays major role in company health program. Goal is protection of customers and employees.



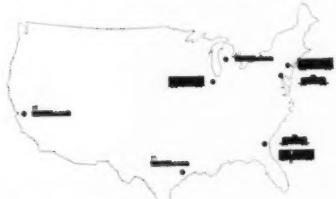
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trial hygienist meets his toughest test in the chemical process industries. Not only must he be familiar with the toxic aspects of a number of chemicals, but he is constantly faced with the task of seeing that proper precautions are taken in the case of new products.

Most new products are handled long before they are placed on the market and many of them have properties that make them health hazards even during the experimental and pilot-plant stages. To insure safe production-plant design, the industrial hygienist is often consulted at the blueprint stage of the process.

One notable result of this close cooperation between process design and industrial hygiene is the blueprint marking systems for vent lines. Formerly, these were indicated by an arrow pointing up (to an outlet in the ceiling) or an arrow pointing down (to an outlet in the sewer).

Now, very often, vent lines lead to condensers, scrubbers or other trapping devices. And it is not unusual for the additional equipment entailed to pay for itself in recovered product.

A case in point: Dust fumes were a problem in an operation at one of Cyanamid's large plants. The dust had not proved harmful, but constituted a nuisance for workers. The industrial hygiene staff, when consulted, recommended a trap. The trap increased individual productivity by eliminating the nuisance. In addition, the recovered dust paid for the cost of installation in less than a year.

Surveys: One of the most important duties of the industrial hygiene staff is to make periodic studies and surveys of plants. The surveys show what benefits have resulted from past recommendations and indicate what steps are desirable for the future.

The studies are based on personal observation of working places plus data obtained by physical measurements and chemical determinations. Among the physical measurements that might be made are temperature and humidity recordings, sound intensity and vibration frequency, radiation measurements, interferometer measurements, and dust counts. Chemical determinations include air sampling and analysis to determine concentration and nature of contaminants under working conditions.

Equipment: To obtain these measurements, the industrial hygiene team at American Cyanamid has at its disposal a wide variety of instruments. The portable interferometer measures the difference in refractive index be-

tween pure air and air containing solvent vapors. It gives an easy on-the-spot determination of vapor concentration in the air.

Other instruments frequently used are: the electrostatic precipitator, and midget impinger for collecting dust samples; the velometer, with attachments, for studying plant ventilation; and various instruments for measuring concentration of gases.

Plain Talk

Chemical companies, along with others, can take heart from the government policy of phrasing new directives. Price Stabilizer DiSalle (to name one) is pioneering a movement to have all orders written in a readable, understandable style.



MIKE DI SALLE: Double-talk is out.

DiSalle goes over every order with a pencil before signing it. But the streamlining process starts before that. Public relations men from the Economic Stabilization Agency and the National Production Agency sit in at the first draft of every order. Their job is to see that down-to-earth words are used wherever possible. They do not, of course, change substance.

World War II: The edicts are still not models of literary composition, but they are a far cry from some of the epics turned out by World War II's OPA. For example, a sentence from the first page of revised maximum price regulation No. 169, a 79-page meat order issued on Feb. 22, 1944, reads: "Insofar as this regulation uses specifications which were not, prior to such use, in general use in the trade or industry affected, or insofar as their use was not lawfully required by another government agen-

cy, the administrator has determined with respect to such standardization, that no practicable alternative exists for securing effective price control with respect to this regulation."

In or out of context that sentence is almost impossible to understand. Apparently, it is a justification of the method of control.

Now: In sharp contrast to that, is the recent order issued by the Office of Price Stabilization. The order will bring meat slaughterers under special license. A sentence from the order: "This order is a necessary step in a large effort to prevent dislocation of the normal channels of distribution for meat, with the resulting hardship to business and consumers."

The catch: Despite the improvement, lawyers may yet be necessary for interpreting the edicts. Orders that are readable are fairly easy to write. But they make for loopholes and sometimes create hardship cases. When the government starts writing orders to cover every possible case, it may have to use the string of dependent clauses that go to make up "governmentese."

Basin Reports

Within the week, the Public Health Service is expected to issue the first of its fifteen basin reports. First report will cover water pollution in the Tennessee River basin. Succeeding ones (to be published during spring and summer) will cover remaining rivers in the U.S. The reports are intended to serve as a basis for a comprehensive pollution control program.

Public Health Service says that the country needs 6,500 municipal sewerage treatment plants and 3,400 industrial waste water treatment works. Figures on industrial waste treatment are not complete. One reason is that data on some sections of the country are not available.

Federal law passed in 1948 authorized \$22.5 million for financing the building of sewerage treatment plants. However, neither the 80th nor 81st congress appropriated the sum. Late last year, \$1 million was passed out to the states for research on industrial waste.

The law provides funds for study of industrial waste treatment only. Industry cannot get money as loans or grants to help build treatment works.

Dr. Leonard A. Scheele (surgeon general of the USPHS) says that doubled industrial production of the last fifteen years has taken its toll of our usable water resources. And the

present expansion programs for defense cannot be accomplished without control measures which will allow reuse of critical water supplies.

The problem is particularly acute, for industries requiring large amounts of water. That, of course, would include the chemical, synthetic rubber and fuel, pulp and paper, steel, and munitions industries.

Business firms can get certificates of necessity for treatment facilities essential to national defense. And they can get accelerated amortization under Section 216 of the 1950 Revenue Act. That is a big help to companies holding defense contracts who are being forced by state health departments to build water treatment works.

Dr. Scheele gives two other reasons why mobilization plans may result in increased water treatment facilities. First, the Defense Production Act of 1950 may require federal agencies who are building or adding to industrial plants to provide for the treatment of water waste. And secondly, government contracts and leases can stipulate the building of treatment facilities.

Sulfur Outlook

There will be no sulfur or sulfuric acid allocation order issued by the National Production Authority until the sulfur shortage gets an airing during the hearings now under way in Congress. Representative Thomas G. Abernethy, chairman of the special fertilizer and farm machinery subcommittee of the House Committee on Agriculture asked defense mobilizer Charles E. Wilson to hold off action until his committee's hearings had been held. The hearings began Tuesday, Feb. 20.

Abernethy said the hearings are to determine the quantity of fertilizer required to meet needs and assist in finding the sources of that fertilizer.

Supply of fertilizer is tied to the supply of meat and dairy products. If the shortage of superphosphate continues, farmers will not be able to produce as much beef cattle and other animals.

"The proper application of adequate fertilizer will result in increased quantities of agricultural products that can be calculated almost as certainly as the industrial chemist calculates the end result of his formula," Abernethy asserts.

In the case of sulfur and sulfuric acid there has been for the past years a growing margin of consumption over production. This has now reach-

ed the point where, with the added impact of the defense program, sulfur supplies in the coming year will fall considerably short of the over-all demand unless additional sources can be developed immediately," he claims.

One of the first witnesses at the hearing was Frank K. Wooley, of USDA's production and marketing administration. He reviewed the tight supply of sulfur, sulfuric acid and nitrogen and then gave USDA's official estimates for 1951 of sulfur requirements for soil needs, sprays, dusts and other uses, which are about 1/6 over 1950 consumption.

Wooley said farmers will need 1,335 million long tons of sulfur for superphosphates, 420,000 long tons for ammonium sulfate and 219,000 for other uses. He believes sulfur production has hit peak and may begin



SULFUR: Congress airs shortage.

to fall off. The USDA spokesman said that to increase sulfur for fertilizer, efforts should be made to recover by-product sulfur now escaping as fumes from smelters, and controls should be put on sulfur to channel it into fertilizers.

Sulfur for fertilizer: Russell Coleman, president of the National Fertilizer Assn. agrees with USDA but also says that U.S. should re-examine its sulfur export policy. Perhaps the foreigners could do without our sulfur.

The NFA says that if there is no cut-back in the amount required by sulfuric acid producers for the fertilizer industry, well over one million tons of the five million ton estimated 1951 production of domestic sulfur will be used in fertilizer.

Paul T. Truitt, president of the American Plant Food Council, Inc., estimates that farmers will get about one-fifth less superphosphate this year than in 1950.

Sulfur producers told the committee that sulfur production is down this year and that they are cutting orders of domestic users, affecting fertilizer production. Langbourne M. Williams, president of the Freeport Sulfur Co. told the committee that supply to his domestic customers has been sliced 15%.

Dale Miller, of the Texas Gulf Sulphur Co. said his firm has cut its customers for the first quarter of 1951 by 20%.

L. L. Laquier of the Phillips Chemical Co., Bartlesville, Okla. urged development of sulfur from any source—including smelter gas, sour gas, pyrites and small sulfur domes. He told the committee his firm is ready to consider building a plant to get sulfur from sour gas in west Texas.

Phillips would build the plant if it could be assured that the sulfur would be available only for its own fertilizer operations.

Jesse Johnson, manager of the Atomic Energy Commission's raw materials office told the committee superphosphate plants would use about 340,000 tons of sulfuric acid this year. Planned expansion for 1952 calls for use of between 600,000 and 700,000 tons of acid.

Johnson also broke a minor secret when he revealed that an "economically feasible" process for extracting uranium from phosphates during the manufacture of fertilizer has been discovered.

To get the uranium, certain extra processing facilities to plants already making triple superphosphates have to be added. The uranium is extracted between the stages of phosphoric acid and the final product. Details of the process are classified, the AEC later said.

Joseph S. Bates, director of NPA's chemical division, said NPA is working out a system of rationing. But he couldn't say now just how high fertilizer for farmers would rate as an essential user of sulfur. He is "sympathetic to farmers' needs," but in his job—he has to be "sympathetic to the needs of other industries, too."

EXPANSION

Du Pont: A new production unit for hydrogen peroxide will be built in Memphis, on the site of the sodium cyanide plant which is now under construction. The new unit will produce the peroxide by an improved process developed by Du Pont. The unit will be in production by the end of next year.

The new plant will be the first one for producing hydrogen peroxide in

BUSINESS & INDUSTRY

the South, where use of the chemical is expanding in the textile industry. Present Du Pont plants for producing the peroxide are located in Niagara Falls and Dresden, New York.

Petrol Refining Co.: The Texas City plant for producing aviation gasoline will be reopened and in production by Mar. 1. E. W. Neason of the Oil Trading Company of Texas (representing Petrol on purchase of crude and sale of products) says the company is seeking a supply of from 25,000 to 30,000 barrels of crude oil daily. The company has a commitment to produce 100 to 130 octane gasoline for the armed forces.

Ketchikan Pulp & Paper: The company (a joint venture of the Puget Sound Pulp and Timber Co. and American Viscose Corp.) will begin construction of a \$30 million high alpha mill near Ketchikan, Alaska, this spring.

Under present plans the RFC will supply half the necessary capital. Initial capacity will be approximately 300 tons of pulp a day; later, 500.

PEOPLE



VICTOR CONQUEST: New Armour vice president

Armour and Company: Two new vice presidents have been named by the board of directors. Victor Conquest will be vice president in charge of the research division. He has headed Armour research for the past 20 years.

Thomas E. Hicks is the other vice president named by the board. General manager of Armour Labs since August, he will be vice president in charge of laboratories.

Joseph B. Koepfli, on leave from the California Institute of Technology, will head the State Department's new Office of the Science Advisor. The appointment followed a consultation of a number of the country's leading scientists with the State Department.

Creation of the office is a result of recommendations of Lloyd V. Beckner, special consultant to the State Department. In a report published in June, he suggested a world wide science intelligence gathering and disseminating system.

J. Herbert Babcock is a new vice president of Hooker Electrochemical. Since 1949 he has been director of development and research.

In other new appointments at Hooker, Charles H. Winkler will be assistant treasurer, and Thomas F. Willers, comptrollers.

FOREIGN

Germany: Reports on Germany's chemical production for 1950 indicate that although output in general was good, it began to drop toward the end of the year.

Chemical manufacturers say the general rise was directly attributable to increased efforts by management and labor. Repair and construction of factories damaged during the war is now regarded to be nearly complete.

However, manufacturers are worried over the slump at end of year. The general production index for 1949 (1939=100) was 92. It rose to 98 in January, 137 in September, but fell to 132 in October, and 126 in November. Production reached the limit in some basic sections; in others it was restricted by the occupational authorities.

Producers blame the decline in production on raw material shortages, arising from import restrictions. Another factor was the shortage of coal and electricity. In Germany, the chemical industry is the third largest user of coal—for fuel and electricity.

Great Britain: A factory in South Wales is now supplying British hospitals with aureomycin. Producers (Cyanamid Products, Ltd.—a subsidiary of American Cyanamid) say the plant has capacity to supply domestic needs and leave a balance for export.

At present, the drug is being refined, purified, and capsule at the plant at Hirwaun, near Cardiff. Intermediates are imported from the U. S.

India: The country is attempting to produce its own molding powders to

feed its plastics industry. Foreign powders, particularly polystyrene from the U. S., have been subject to severe import restrictions as a result of India's dollar shortage.

So far, India has evolved various grades of thermoplastic molding powders from such indigenous raw materials as shellac, bhilawal shell liquid, and cashew shell oil.

Australia: Monsanto Chemicals (Australia) has started synthesizing chloromycetin by the Parke-Davis process. The Melbourne plant will ultimately be able to meet all Australian requirements for the drug.

Chloromycetin is the second antibiotic to go into production in Australia. The Commonwealth Serum Laboratories, operated in Melbourne by the government, has been making penicillin for some time.

Government Needs

The Navy Purchasing Office (111 East 16 Street, New York City) will receive bids until March 16 on 5,000 lbs. of sodium metasilicate, under bid invitation No. 8370.

The Chief Purchasing Division, Federal Supply Service, GSA, (250 Hudson Street, New York City) will receive bids until March 8 on 26,500 lbs. of trisodium phosphate on invitation No. NY-2H-28261. Until March 16, the office will receive bids on 140 drums of water emulsion wax and 5,600 lbs. of paste wax. This bid is under the same invitation.

Gov't. Contract Awards

Minnesota Mining & Mfg.: 51,855 gal. of water resistant adhesive for caseliner—\$44,766.49.

Abbott Laboratories: 14 million bottles of Halazone water purification tablets—\$74,550.

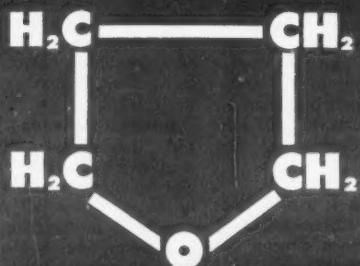
Kamen Soap Products Co.: 300,000 lbs. of laundry soap—\$27,000.

Pioneer Soap Co.: 350,000 lbs. of laundry soap—\$27,000.

Turco Products Co.: 10,700 gal. of synthetic detergent cleaner—\$39,758.

Metals Disintegrating Co.: 549,000 lbs. of powdered aluminum (grained) Grade I—\$142,000.

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PHYSICAL PROPERTIES

Appearance	Colorless, mobile liquid
Odor	Ether-like
Molecular Weight	72.10
Boiling Range @ 760 mm.	65-67°C.
Specific Gravity, 20/4	0.887
Index of Refraction, N20/D	1.407
Flash Point	-17°C.
Vapor Pressure @ 25°C.	176 mm.
45°C.	385 mm.
65°C.	760 mm.
Solubility	Miscible with water and most common organic solvents

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for plastics and films can be formulated with TETRAHYDROFURAN. Typical compositions include a 10 percent solution of polyvinylidene chloride in TETRAHYDROFURAN to seal polyvinylidene chloride sheets and bags. Also,

a 10 percent solution of polyvinyl chloride in TETRAHYDROFURAN is an effective adhesive for polyvinyl chloride sheets.

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have unusual solvent power. The mixture is a better solvent than TETRAHYDROFURAN alone for materials such as cellulose acetate. Mixtures of TETRAHYDROFURAN with water are more effective solvents for alkaloids such as caffeine than either TETRAHYDROFURAN or water alone.

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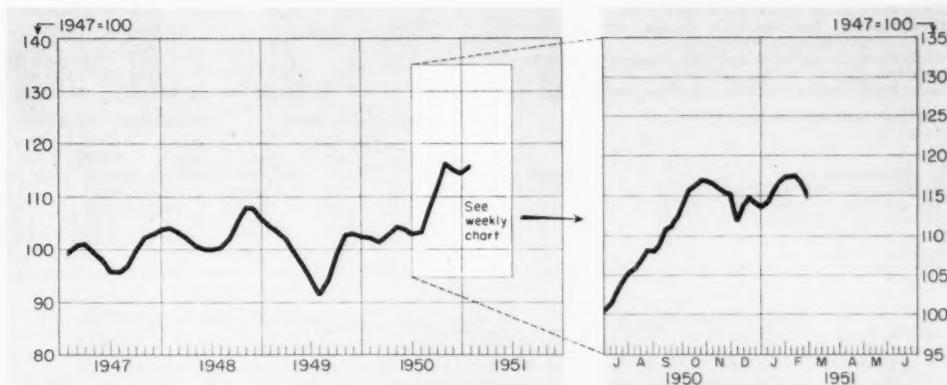
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CHEMICAL MARKETS . . .



CHEMICAL INDUSTRIES OUTPUT INDEX—Basis: Total Man-Hours Worked in Selected Chemical Industries

This week the Washington spotlight shifts from the Office of Price Stabilization to the U.S. Department of Agriculture. Normally in the background, USDA has emerged in the political arena to represent the needs of agriculture on legislation relating to crop prices, fertilizer and insecticide supplies.

Current business indicators point to an upswing in the CIW chemical output index, following a two-week decline. This temporary dip was primarily the result of recent rail walkouts, with seasonal factors and conversion problems also contributing.

Since World War II, Japan has been steadily rebuilding a nearly shattered industrial economy, with evidence of success. Ammonium sulfate fertilizer production in 1950 was 1.5 million metric tons, exceeding the prewar peak of 1.24 million. Although most of the production has been eagerly taken by Formosa and the Philippines, active inquiry has also been coming from Central and South America.

Practically everyone in the petroleum industry seems to concur in the principle of tetraethyl lead allocation, rather than the short-lived octane reduction proposal just abandoned by the Petroleum Administration for Defense. The TEL allocation plan calls for a 20% usage reduction for each refiner, in excess of 1 million lbs. annually. By 1952, new production facilities for TEL should improve the supply outlook for refiners and their numerous car-owner clients.

An increase of 100% in polyethylene production by DuPont will be brought in sometime around the end of 1951. This expansion may have implications for the vinyl plastics industry eventually, but for the next few years, demand for both products will emphasize output, minimize competition.

Inorganic chemical production for December marked the beginning of an upward trend that continued until the recent railroad tieup. Of 37 heavy inorganic chemicals, 30 registered gains over November, and some reached all-time highs; e.g. ammonia, nitric acid, sulfuric acid, and caustic soda.

MARKET LETTER

MARKET LETTER

WEEKLY BUSINESS INDICATORS

	Latest	Week	Preceding	Week	Year Ago
Chemical Industries Output Index (1947=100)	116.9			115.0	103.0
Bituminous Coal Production (Daily Average, 1000 Tons)	1,822.0			1,408.0	404.0
Steel Ingot Operations (% of Capacity)	99.8			99.5	70.3
Wholesale Prices—Chemicals and Allied Products (1926=100)	147.4			147.2	115.3
Stock Price Index of 14 Chemical Companies (Standard & Poor's Corp.)	223.7			227.0	162.1
Chem. Process Industries Const. Award (Eng. News-Record)	\$93,894,000			\$27,581,000	\$2,834,000

MONTHLY BUSINESS INDICATORS

	Million Dollars	Manufacturers' Sales			Manufacturers' Inventories		
		Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturers	\$21,341	\$21,134	\$15,756	\$33,978	\$33,004	\$28,879	
Chemicals and Allied Products	"	1,480	1,529	1,063	2,307	2,267	2,059
Paper and Allied Products	"	660	668	474	729	699	687
Petroleum and Coal Products	"	1,871	1,870	1,518	2,121	2,180	2,194
Textile Mill Products	"	1,250	1,290	965	2,814	2,768	1,965
Leather and Products	"	268	287	228	621	608	509

How to maintain the flow of needed metal imports under existing price ceilings is a problem that needs an early answer. Copper goes for 45¢ a pound in foreign markets, compared with U. S. limits of 24½¢. Foreign suppliers of zinc are not in a hurry to sell here at 17½¢, when they can sell elsewhere at 27¢ a pound.

The case for a rate increase presented by the railroads has encountered powerful opposition by industry, agriculture, and government. An early settlement of the application by ICC is expected, but prospects for granting the 6% increase are dim.

Importers of botanicals and essential oils have acquired over the years, a reputation for a calm approach to thorny problems in foreign commerce. But they are still patiently striving for clarification and relief from ceiling price regulations which make their replacement costs higher than permitted selling prices.

Smaller in scope than some large-volume commodities, but important to those concerned, is the latest impasse in carnauba wax. Determined buyer resistance in the U. S. caused prices to drop gradually for several weeks from recent pinnacles, but now prices have levelled out as buyers and Brazilian sellers approach the next round.

More give-and-take between the Office of Price Stabilization and the U. S. Department of Agriculture inches into the headlines. Last week OPS imposed rollbacks and ceilings in corn, cottonseed, and soybean oil. Following this action at a short interval, came the USDA proposal of higher support prices for soybean and corn to encourage bumper crop.

Here is a hopeful note in the controversial fertilizer situation: There will be 15% more potash and 20% more nitrate in 1951 than was available last year. These can be used as a partial replacement in the anticipated superphosphate supply shortage.

SELECTED CHEMICAL MARKET PRICE CHANGES—Week Ending February 26, 1951

UP

	Change	New Price		Change	New Price
Anise, Chinese	\$.005	\$.385	Egg Albumen, tech., cryst., bbls.	\$.02	\$.87
Carnauba Wax, No. 1 Yellow	.02	1.35	Eucalyptus Oil, 80-85%	.50	2.50
Castor Oil, unbodied, tanks	.03	.39	Gum Arabic, amber sorts	.005	.155
Citronella, Ceylon, drums	.15	2.65	Gum Karaya	.02	.40
Cocoa Butter	.01	.81	Peppermint Oil, redist., USP	.40	8.15
Corn syrup, 42 degree, cwt.	.29	7.45	Saffron, Spanish	1.00	26.00
Dextrose, gum, cwt.	.37	8.72	Tung Oil, imported	.005	.40

DOWN

Coconut Oil, crude, tanks, Pac. ports	.005	.215	Psyllium Seed, Indian	.03	.19
Menthol, natural, USP	.25	13.75	Sandalwood Oil, cns.	.50	12.50

Prices per lb. unless quantity is stated

BOOKS

Superfluids, Vol. 1, by Fritz London. John Wiley & Sons, Inc., New York, N. Y.; 161 pp., \$5.00.

In this first volume of two, the author presents an electrodynamical theory of superconductivity, based on the theories first advanced by himself and his brother in 1935. The present volume presents a modernized version of the theory that was developed in order to comprehend the Meissner effect, which had just been discovered at that time. Since the peculiar low temperature transfer mechanisms exhibited by superfluids seem related to the microscopic electronic mechanisms of atoms and molecules, the conclusion is that they are pure quantum mechanisms on a macroscopic scale. The essential results, therefore, are interpreted from a consistent macroscopic viewpoint with an attempt made to locate the quantum mechanical problem. Beginning with a discussion of the properties of the superconductors and their thermodynamic correlation, the book closes with a program for the molecular theory of superconductivity.

Organic Reagents for Organic Analysis, by Hopkins & Williams, Research Laboratory Staff. Chemical Publishing Co., Inc., New York, N. Y.; 263 pp., \$5.00.

The second edition of this book, like the first, reviews the use of organic reagents in preparing derivatives of organic substances for purposes of identification by melting points, always emphasizing the reagents and their capabilities. While containing 100 pages on new developments in this field, the present edition still follows the original plan of organization. The first section is devoted to the major classes of organic compounds with "Selected Reagents" listed for each as those best for the identification of the class. In the second part is a detailed discussion of these "Selected Reagents" in alphabetical order, listing the groups of organic compounds for whose identification the reagent is used and describing the methods of preparation. Melting point tables of the derivatives discussed make up the third part of the book.

Synthetic Detergents, by John W. McCutcheon. MacNair-Dorland Co., New York, N. Y.; 435 pp., \$7.10.

To meet the need for a practical text on detergent compounds created by the rapid rise of the synthetic de-

tergents industry during the past ten years, this book discusses the general aspects of synthetic detergents from the practical standpoint.

The various types of detergents are defined according to class, method of manufacture, application, and processing. In addition to analyzing the manufacturing processes involved and the various applications and uses of surfactants, the author presents a theoretical background on the fundamentals of surface activity and the relation of surface activity to such characteristics as detergency, emulsification, foaming, wetting and dispersion. Each class of synthetic detergents is explained in regard to chief types, characteristics, and future utility, with specific reference to products actually on the market. Formulas, manufacturers, and uses of more than 700 surface active agents are tabulated in the appendix. This text will be of interest to men engaged in every phase of the detergent field.

Perfumery Synthetics and Isolates, by Paul Z. Bedoukian. D. Van Nostrand Co., Inc., New York, N. Y.; 488 pp., \$7.00.

Following the development of perfumery compounds according to its three main sources, this volume reviews the history and chemistry of the synthetic perfumery industry as one of the many results of research in organic chemistry. In covering the principal perfumery synthetics, the author notes their occurrence, physical and chemical properties, methods of manufacture, uses and other pertinent data. A final section of the book deals with the more important analytical methods employed in the examination of perfume synthetics and isolates; these are the standard procedures used in industry. Additional literature references are listed for those desiring more complete information on the subject. Not meant to be an academic treatise, this book will be of general interest to chemists as well as those engaged in the essential oil and perfume industry.

Briefly Listed

BULLETIN 156, MINERAL COMMODITIES OF CALIFORNIA, prepared by the staff of the State Division of Mines presents the geological occurrence, economic development, and utilization of California's resources plus distribution map of state's mineral resources. Available from the California Division of Mines, Ferry Building, San Francisco 11, Calif. at price of \$2.00. Map only, 50 cents.

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FACTORY MANAGEMENT & MAINTENANCE
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McGRAW-HILL PUBLISHING CO., INC.
330 W. 42nd St., N. Y. 18, N.Y.

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HOW TO USE COUPON

Mail the coupon at the bottom of page. Circle page numbers of items about which you want more details. Then write your name and address and mail it to us. Your request will be forwarded to companies concerned, the answer coming direct to you.

MAKES IT HANDY

Products and literature in this issue are listed on these pages. There are three indexes. (1) Editorial items on new products, new equipment, new literature; (2) products advertised. (3) The index of advertisers is on the following page.

THE NUMBERS

Advertisements:—There is a page number on the coupon for each advertisement. Before the number, may appear, L, R, T, B (left, right, top, bottom), locating the ad on the page; small letters following (a, b, c) indicate additional products in the advertisement.

Editorial Items:—Numerals are page numbers; the ABC's distinguish among items where more than one is on a page. There is a number on the coupon for each item referring to new products, equipment, and literature.

EDITORIAL ITEMS

For more data, circle number on coupon

NEW PRODUCTS

Dibutyl Phosphite	20A
Di-(2-ethylhexyl) Phosphite	20B
Diethyl Phosphite	20C
Hafnium	19A
Tributyl Phosphite	20D
Tri-(2-ethylhexyl) Phosphite	20E
Triethyl Phosphite	20F

NEW EQUIPMENT

Level Control	23A
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CHEMICALS	
Ethylene Chlorobromide	40B
Wool Dyeing	40A

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Electric Scale Control	40E
High-speed Generators	40I
Mixers	40H
Process Control Equipment	40G

GENERAL

Technical Data Catalog	40K
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PRODUCTS ADVERTISED

For more data, circle number on coupon.

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Albumin tannate	T3d
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Bead	8c
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Powder	8a
Dichloran	T3e
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For detergents	23b
Menadione	T3a
Monobromated camphor	T3c
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Plasticizers	2c
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Propyl gallate	T3f
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READER SERVICE COUPON

Mail to Chemical Industries Week, 330 W. 42nd St., N. Y. 18, N. Y.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

CITY & STATE _____

Editorial Items

19A	20C	20F	40B	40E	40H	40K
20A	20D	23A	40C	40F	40I	40L
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BOOKLETS

Chemicals

*Vinyl Plastic Fillers

10-p. data sheet on the "Evaluation of Inert Fillers in Vinyl Plastics" explaining the basis used for the evaluation study with reference to the nine fillers discussed, the recipe employed, and the method followed to determine filler concentration. Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio.

*Vinyl Plastic Coatings

12-p. illustrated bulletin dealing with vinyl plastic coatings for the control of corrosion on exteriors of steel, concrete, brick, formed block and plywood structures and as a tank lining, including a chemical resistance chart. Casey & Case Coating Co., P. O. Box 151, Maywood, Calif.

Wool Dyeing

Bulletin entitled, "Studies of Wool Dyeing: The Influence of the Cuticle in the Dyeing of the Wool Fiber" by H. E. Millson and L. H. Turl should be of value to those interested in the chlorination of wool. Calco Chem. Div., American Cyanamid Co.

Ethylene Chlorobromide

Technical data sheet giving detailed information on the properties, analysis, grades, and potential uses of ethylene chlorobromide as a solvent, intermediate, and fumigant. Westvaco Chemical Div., Food Machinery & Chemical Corp.

Equipment

Cellular Rubber

20-p. booklet covering the properties of and test data on cellular rubber and giving detailed information on grades of sponge rubber, compression, influence of heat and aging, insulation value, resistance to oils and chemicals, specifications and tolerances, plus a summary of the firm's products. The Sponge Rubber Products Co.

Centrifugal Pumps

8-p. bulletin giving instructions for installation and operation of centrifugal pumps with reference to piping, priming, lubrication, packing, starting, renewal parts and common difficulties to be detected. Lawrence Machine and Pump Corp.

Electric Scale Control

Folder featuring company's electric scale control to be used for controlling the formation of scale in all types of equipment using or cooled with water. Aqua Electric Scale Control, Inc.

Air Filter

Bulletin devoted to American Type HV

* Request must be made to company on business letterhead.

high velocity unit air filter, made of corrugated strips of fine mesh wire, and designed to operate at velocities up to 500 fpm and maintain a high efficiency over a wide range of air velocities. American Air Filter Co., Inc.

Process Control Equipment

Bulletin on proportioning, blending and process control equipment, giving descriptions and specifications of various precision units and containing 21 pictures of typical control panels and automatic scales of the "pre-weighing" type, which refers to the delivery of prescribed amounts of material. Richardson Scale Co.

Mixers

32-p. booklet covering firm's line of mixers in all sizes and capacities utilizing cutaway illustrations to point out improvements in design and construction and layout drawings to show various methods of installation in combination with other machines. Farrel-Birmingham Co.

High-speed Generators

Bulletin describing four designs of high-speed synchronous generators, noting their construction features and including a comparison table of ratings. General Electric Co.

Bin Valve

Bulletin describing and illustrating "Twistite" double-closure bin valves, constructed so that flexible rubber sleeves twist and prevent leakage through or from valve without need of gaskets, packing or sliding joints. Stephens-Adamson Mfg. Co.

General

Technical Data Catalog

1951 catalog containing over 2000 listings of pocket-size technical books of value to engineers, construction men, technical workers, and technical students. Each book consists of 140 pages of tables and data in loose leaf form to be used for reference right on the job. Lefax Publishers.

Trade Shows and Conventions

Brochure entitled "Exposition Capital of the World," presenting Grand Central Palace's new package plan designed for trade shows limited in size and needing facilities in New York City for show purposes. Grand Central Palace.

Technical Publication

32-p. new periodical, Labitems, containing articles of technical and general information, plus news and photographs of more than 50 new products, should be of interest to laboratory technicians, engineers and management. Emil Greiner Co.

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